

cocoa-palms, and betel-palms. Along the coast and on some of the creeks is a valuable sandy or alluvial soil known as *pulan* or *shitta*. It is often covered with drift sand, but when the sand is cleared the loam yields excellent rice, the richest cocoa-palms, and fine cashewnut, and *undi* trees *Calophyllum inophyllum*.

Above the Sahyádris, except where the underlying iron clay rises to the surface, the soil is good. The best called *kagdali* is a red mould containing very small stones. In some places the soil is a stiff moisture-holding clay. Besides garden land, rice land or *tori* and dry-crop land or *kushki* are found. Rice land, as a rule, yields only one crop which is grown either with or without watering. In some parts much of the rice land yields two rice crops or a crop of rice and an after-growth of pulse. Sugarcane is grown once in three years, fine fields being often seen up the Gangávali valley. The supply of water is the main difference between good and bad rice land. Above the Sahyádris very little water is stored. The ponds are few and small, and the rice depends on the rainfall either on the field itself or on rain water brought from the uplands by small ditches. Most of the well-watered valleys that cross the forests and many level plots of excellent soil lie waste and timber-covered from want of husbandmen and from the sickness of the air.

Above the Sahyádris garden crops are the staple produce of the west and rice of the east. The coast gardens are very unlike the usual garden tillage in Dhárwár or in the Kánara villages that border on Dhárwár. In the inland parts, as a rule, garden crops are grown only round wells and ponds. But along the coast, if only care and skill are given to it, almost all of the rice land will yield garden crops. Much of the coast land which is assessed as garden land had originally nothing either in soil or in position specially suited for the growth of garden crops. On the coast most of the garden land is given to cocoa-palms, whose proper culture requires much care and skill. A little inland the cocoa-palm is often mixed with the *supári* or betel-palm. Further inland in the valleys at the foot of the Sahyádris and on their lower slopes are the rich palm and spice gardens, which are the special glory of Kánara. Except in Supa in the north, where the gardens are poor, without cardamoms or betel vines, with few cocoa or betel palms, and with plantains as the staple produce, these spice gardens are wonderfully rich and are managed with great skill.¹ They vary in area from a fifth of an acre to ten acres, and may be roughly estimated to average about one acre. Their shape depends on the form of the valley. As a rule they are long and narrow, hid among hills thick with evergreen forests, in deep shady dells watered by a network of runnels. They are guarded by high banks or by a thick belt of forest timber and brushwood. Within the belt is a strong fence and within the fence a second ring of mangoes, jacks, pines, plantains, cocoa-palms, oranges, citrons, pomaroes, apples, and *Garcinia pumila*, *Artocarpus lacucha*, and other

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fruit trees. Besides the fruit trees are rose and jessamine bushes, and of vegetables cucumbers and cornered cucumbers, gourds and snake-gourds, radishes, yams, chillies, and brinjals.¹ In the centre of the gardens are rows of betel-palms with black pepper and betel-vines trained up their stems, and cardamom bushes in shady spots between the rows of palms and plantains. Most of the owners are Havig Bráhmans some with divided and some with undivided families. Their houses are on raised sites outside of the garden. The garden work is partly done by debtors who have pledged their labour, but chiefly by gangs of labourers from the Goa, Honávar, and South Kánara coasts who come in November and go home in June. The Havig's family do the house work, look after the cattle, gather cowdung for manure, pick and separate the betelnuts from the husk, clean boil and cut them in half, clean and dry cardamoms, make bundles of newly plucked betel leaves, and prepare and dry pepper. The hired and the pledged labourers are employed in digging and carrying earth to the roots of plants and trees, in fetching *sappa* or green leaves for manure, and in climbing betel-palms to gather betelnuts and betel leaves.

In choosing a site for a betel garden the chief points are soil, position, water, and manure. The best soil is a red soapy clay, damp and easily worked. The garden should if possible face east, as the evening sun often does harm. As the garden must have shelter and leaf-manure, it is important to secure an outer belt of forest and brushwood. The fence, which is five or six feet high, is made of live thorn bushes, the branches being held together by split bamboos fastened to wooden or bamboo posts about six feet high and six or eight feet apart. In some cases the fence is entirely of bamboo posts and is renewed once a year. The fence surrounds the garden and has only one narrow gate. A ditch three or four feet deep and three feet broad surrounds the fence and serves the double purpose of strengthening the fence against the attacks of animals and of draining the garden during the wet months. Inside of the garden the ground is dug into a line of beds about twenty feet wide and surrounded by trenches which run parallel to each other in the direction of the length of the valley, generally nearly east and west. These trenches act as drains and in some gardens drainage is wanted all the year round to give an outlet to underground springs. Soil which is full of underground springs is specially valuable. But spring water if left stagnant does harm, and nothing grows unless the soil is carefully drained. The trenches are about a foot broad, and, according to the moisture of the soil, a foot to a foot and a half deep. The garden must command an unfailing supply of water. The water is commonly brought from springs which abound at the head of every valley. It is gathered in a small pond or reservoir and from the reservoir is brought by a channel which passes along the upper side of the garden. Water is also brought in channels from the small rivulets of which the country is full. Rich m

¹ The snake-gourd *Trichosanthes anguina* in Kánarés is *padvala* , and cornered cucumber *Cucumis acutangulus* is *Kire kái*.

occasionally fill the bed of one of these rivulets and turn it into a garden. The hollow of the stream-bed above the garden becomes a reservoir, and a canal is cut outside of the garden to carry off the flood waters. A river-bed garden is costly to make as the filling of the channel is expensive, and as the reservoir and the canal must be strong enough to stand the torrents of the rainy season.

In October young plantain trees are set in rows within two feet of each side of the drains and twelve feet from each other. The whole garden should then if possible be covered with branches of the *nelli* or *Phyllanthus emblica*; in any case, some branches must be strewn near each young plantain tree, and at the same time the centre channel of each bed must be raised a foot and a half with earth from the neighbouring hills. When the rainy season is over the earth that was heaped in the centre is spread over the bed, and instead of a mound a channel is dug and water is passed along the channel once in fifteen days. In watering the garden the channel is filled, and the water is splashed or scooped from it on the roots of the trees. At the close of the second rainy season, between every two plantain trees a pit is dug a foot and a half square and a foot and a half deep, and, from the nursery where it has been raised, a young betel-palm is lifted with as much earth as possible and planted in each pit. The pit is filled with fresh earth, which is trampled in with the foot, and the space filled with the leaves of the *Phyllanthus emblica*. In this way the number of betel-palms is gradually increased till the garden is full. Each acre of well stocked garden has 500 to 800 betel-palms and about 300 cardamom bushes. When the garden is full care is needed to have nurseries with a proper proportion of young trees to take the place of those which die or are blown down.

The Betel-palm, *M. Sopári K. Adike*, *Areca catechu*. The nursery from which the young betel-palms are brought is managed in the following way. In February when the betelnuts are fully ripe they are cut and kept eight days in the house. A bed is dug in a shady place and in it the nuts are set nine inches apart, with their eyes uppermost, covered with about an inch of earth. The bed is shaded with dry plantain leaves, and is sprinkled with water once a day. About the end of May, before the rains begin, the plantain leaves are removed and the young sprouts show above ground. In three months more, or after six months in all, the seedlings are half a foot high and are ready for planting. In February, that is about a year after the nuts were first planted, they get a little manure, and during the rest of the dry season they are watered once in four to eight days according to the soil. About two years later, that is when the plants are about three years old and three to four feet high, they are set in their final places in lines under the shade of full-grown plantain trees. Young betel-palms are estimated to be worth 4½d. (3 as.) the hundred; but they are seldom sold as one garden-owner generally gets what he wants from a friend or neighbour. The betel-palm begins to bear fruit thirteen years after its first or ten years after its second planting. In five years more it reaches perfection and lives fifty to a hundred years. When a palm dies, another from the nursery is put in its place.

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To keep a garden prosperous, the soil ought to be manured once in two years. The practice among good farmers is to divide the garden in two, one-half being manured in the first and third and the other half in the second and fourth years. Manuring once in three years is also common. In manuring a garden red clayey soil is dug from the side of the garden and thrown along the middle of the beds between the lines of betel-palms, to a height of eighteen inches to two feet. Round the root of each palm half a large basket of manure is heaped and small branches are laid over the manure to keep it cool. Cardamoms and pepper are always supplied with leaf mould mixed with red soil, and betel-palms and plantains are sometimes manured with cowdung mixed with leaves. The cost of these operations for each acre of garden is estimated at £1 8s. (Rs. 14) for earthwork, £1 10s. (Rs. 15) for manure, and £1 12s. (Rs. 16) for branches, or a total of £4 10s. (Rs. 45), that is £2 5s. (Rs. 22½) a year if the garden is manured once in two years.

The betel-palm gives little trouble except at two seasons, when the nuts are sprouting and when the nuts are ripening. When the nuts are sprouting they are often attacked by a blight called *kol* caused by sudden changes of rain and sunshine. To prevent the blight spreading, the broad fibrous sheath of a ripe betel-palm leaf is tied over each bunch by a class of men called Hasselrus, who are paid 1s. (8 as.) for every fifty trees or 16s. (Rs. 8) an acre. When this covering is neglected the blight frequently ruins the whole crop. Betel-palms which are too tall and slender to bear a man's weight have their bunches of nuts left uncovered. The bunches of these trees yield five to a hundred nuts, while two hundred nuts are reckoned the average produce of a covered bunch, and in some covered bunches five hundred nuts come to maturity. Each tree usually yields two large or three small bunches. The betelnut harvest lasts during November, December, and January.

In November when the nuts begin to ripen, much care is required in watching and gathering them as the nut loses greatly in value if it is cut at the wrong time. The bunches should be cut before they are ripe, for the ripe nut is used only for seed and by the lowest classes. The Hasselrus who cover the bunches are also employed to cut the nuts. They are very clever at their work. In climbing a betel-palm a Hasselru fixes a rope of plantain fibre round his ankles and under the soles of his feet and sets his feet firm on either side of the stem. He climbs hand over hand drawing up his feet together with a jerk. When he reaches the top of the palm he secures himself by taking a round turn with a rope which he carries in his hand. One end of this rope is tied to the middle of a short board on which the man seats himself and cuts off the nearly ripe nuts, drawing up whatever he wants from an attendant below by a line fixed to his girdle. When he has done, he unties his seat, fastens it round his neck, and sways the tree backwards and forwards till he swings it close enough to enable him to throw himself on another tree to which he again makes fast his seat. In this way he passes over the whole garden without coming to the ground. The fruit of trees that are too tall and slender

support a man's weight is gathered by hooking the head and dragging it to a neighbouring tree. The first class nut is called *chikni*; that gathered a little later is called *betta*; and the last, which has entirely ripened before it is gathered and is used only by the lowest classes, is called *gotu*. The gathering of the nuts costs 8s. (Rs. 4) an acre. Within three days after they have been harvested, the kernels are separated from the husks and cut in half. The kernels are generally cut by the women of the house and sometimes by the men. If the work is done by outside labour it costs about 8s. (Rs. 4) the acre. Next morning the kernels are boiled for about an hour till the eye of the nut disappears. To give a colour to the first nuts they are boiled in a mixture of *nerlu* *Eugenia jambolana* and *kaul* *Barringtonia racemosa* bark and *matti* *Terminalia tomentosa* leaves in the proportion of two parts of the dye to one part of water. The colour of the nuts of the first boiling is never rich and they never fetch a high price. For the second boiling two parts of the water from the first boiling are added to one part of fresh water. After being boiled the nuts are dried on screens and are ready for the market. The yearly outturn of prepared betelnuts from a first class garden is estimated at as much as 4½ pounds a tree, and from the worst gardens at 2½ pounds a tree. The average is estimated at about 3½ pounds a tree or about 10 cwt. (2 *khandis*) an acre. About three-quarters of this quantity is of second class nuts. When the crop is ready agents come round to the gardens and buy the nuts. They are paid at the rate of 2s. (Re. 1) on every *khandi* sold. The price of betelnuts is very variable. At present (1882) it is £24 the ton (Rs. 60 the *khandi* of twenty *mans*).¹ Betelnuts are sent inland in large quantities. From betelnuts and also from the stems of old betel-palms a catechu or *Terra japonica* is extracted which is largely used in dyeing as it yields a fast brown colour.

Cardamoms, *Yelakki*, *Alpina cardamomum*, are common in the beautiful hill gardens that occupy the western valleys of North Kánara immediately above the Sahyádris. Except that they must have plenty of water, the growing of cardamoms gives little trouble. In a new garden cardamoms are grown from seed and in an old garden from cuttings. The seed is sown in October after the outer shell has been removed. It must be carefully sheltered from the sun and takes three months to sprout. When the seedlings are a foot high they are transplanted, and a year and a half later they are set in shady places among the betel-palms and begin to bear when they are three years old. The seed pods are gathered as they ripen in September and October and are dried four days on a mat which during the day is hung in the sun on four sticks and at night is taken into the house. The pods are then fit for sale. When the whole crop has been picked the plant is taken out of the ground, useless wood and roots are cleared away, and it is again planted in a fresh hole. The year after it has been moved the plant yields no fruit, but in the following year it again bears. After the plant

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¹ The betelnut measures are 24 *tolás* = 1 *sher*, 48 *shers* = 1 *man*, 20 *mans* = 1 *khandi*.

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has been moved the old stem dies and a new stem springs from the root. The acre yield of cardamom pods is estimated at twenty-eight pounds (1 *man*) in first class gardens, at twenty-one pounds ($\frac{3}{4}$ ths of a *man*) in second class gardens, and at seven pounds ($\frac{1}{4}$ th of a *man*) in third class gardens. The selling price is about 7s. the pound (Rs. 100 a *man*).

Black Pepper.

Black Pepper, *Kare menasu*, *Piper nigrum*. When the betel-palms are thirteen years old, the garden is planted either with the black pepper vine or the betel-leaf vine which climbs the stem of the betel-palm. The pepper is of three varieties, *kari malisaru*, *sambar*, and *arsina murtiga*, which do not differ in quality but in yield. Of the three, the *kari malisaru* is the best bearer, each vine yielding as much as three pounds (5 *shers*) a year, but it is not easy to grow as it thrives only in *kagdali* or stony red mould. *Sambar* and *arsina murtiga* grow well in the light-coloured soil known as *arsina munnu*; but *sambar* yields only about $\frac{3}{4}$ ths of a pound (1 *sher*) and *arsina murtiga* 1½ pounds (2 *shers*). In August four cuttings of the pepper vine, each about two feet three inches long, are made for every betel-palm. One end of each cutting is set five or six inches deep and the other end is tied to the stem of the palm. The vine wants no further care except tying its branches once a year in May. It bears in six or seven years and lives about twenty-five, so that one betel-palm outlasts three or four sets of vines. The pepper is picked with the help of ladders in March and April. One man cannot gather and cure more than three pounds (5 *shers*) a day. It is picked when the berries are full-grown but not ripe. The pods are piled into a heap in the house and kept for three days. They are then rubbed with the foot, and when the berry is separated from all other matter it is fit for sale. The average yearly yield of each pepper vine is about 1½ pounds, and the acre outturn is about 280 lbs. (10 *mans*) in a first class garden, 140 lbs. (5 *mans*) in a second class garden, and 56 lbs. (2 *mans*) in a third class garden. The selling price is about 3½d. a pound (Rs. 4 the *man*).

White Pepper.

A little white pepper is made by allowing the pods to ripen. For five or six days the pods are spread in the sun to dry. When dry they are steeped in cold water and when thoroughly soaked they are rubbed between the palms of the hands till the husk or skin peels off. They are again washed in fresh water and laid in the open air night and day for three or four days till the sun and the dew bleach them white. They are then ready for use and are stored in new earthen vessels whose mouths are stopped with plantain or betel-palm leaves. White pepper is twice as dear as black pepper, but it is in little demand, as it is used only as a medicine.

Wild Pepper.

Besides in gardens the pepper vine grows wild in pepper forests or *menasu kans*. To keep a pepper forest in order the branches of the vines must once a year be tied to the trees, and the trees must be stripped of all climbing plants especially the *Pothos scandens* and the *Acrostichum scandens*. Every third year all the bushes in the forest should be cut down; and every fifth year the side branches of the trees should be lopped as the vine clings best round straight slender stems. Where the trees are too far apart, a

branch or a cutting should be planted; and if no pepper vine is near, a shoot or two should be set in the earth near the young tree. When thus cared for the pepper vine lives about ten years. When an old vine dies a young shoot must be trained to take its place. As all three kinds of pepper grow wild in the forest, care must be taken to examine the leaf of the shoot to make sure that it is of the best kind. All kinds of trees are reckoned equally fit for supporting the pepper vine; but where the woods are too thin the *bondubala* is commonly planted because it easily takes root. Fruit trees are not planted in case they should attract monkeys. Vines thrive best on trees of middle size and about four and a half feet apart. The shade of large trees is useful, but the stems are not suited for the vines. To prevent the havoc which its fall might cause, when a large tree is seen to wither, its branches are cut, and a circle round the bottom of the stem is stripped of bark. Under this treatment the tree slowly decays, and, as it is relieved of the weight of its branches, it rots without falling in a mass. Except this rotten wood no manure is used. Probably from the want of tillage and manure pepper raised in forests is inferior to pepper grown in gardens. A wild pepper vine, though much larger, seldom yields more than half what a garden vine yields. A man in one day gathers the produce of twenty trees or rather more than twelve pounds; and at the same time ties the branches which is all the labour required. He climbs the trees with the help of a bamboo ladder, some of which are sixty feet long.

The Betel-leaf Vine, *M. Pán*, *K. Vilyadele*, *Piper betel*, is widely grown in plantations in valleys close to the main range both below and above the Sahyádris. When grown in gardens the betel-vine thrives best on mangoe trees. The shoots as they grow are fastened to the stem of the trees with cords made from the spathes or leaf-sheathes of the betel-palm. When the plant is two years old shoots which stretch far from their props are pruned. After the third year once a fortnight leaves can be picked for sale or for use. Shoots which wander far from their props are planted and trained on new trees. To avoid injuring the vines the men who pick the leaves climb the trees with the help of ladders. A full-grown betel-vine yields 100 to 200 leaves every fortnight. An acre of spice garden containing 500 betel-palms is roughly estimated to yield yearly about 40,000 betel leaves worth about £2 (Rs. 20) and costing 16s. (Rs. 8) to grow. The leaves are generally eaten with betelnut and are largely exported.

Though a fully stocked spice garden yields a handsome profit, to start it requires a large outlay of capital and labour. The first return is from the plantains which begin to yield after the third season. Cardamoms and betel-vines begin to yield after three years, and pepper-vines after six years, but about thirteen years pass before the betel-palms are in full bearing. After this an acre of good betel and spice garden land is estimated to yield £25 to £35 (Rs. 250-Rs. 350) a year, and this return will go on so long as care is taken to plant new trees as the old trees become worn out. Estimates of the cost and profits of a betel-palm and of a betel-palm and spice garden show that in a betel-palm garden the yearly acre cost is

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